

legs, wings, and abdomen. The following day I offered her food for the last time; but both head and thorax were dead or paralyzed; she could but wag her tail, a last token, as I could almost fancy, of gratitude and affection. As far as I could judge, her death was quite painless; and she now occupies a place in the British Museum.

Ants.

My experiments with ants have not been very successful; I may, however, just mention the following:—

On the 29th of December I took some red ants and placed them in a glass in my room. On the 4th of March following I put four of them back into their nest, but could not see any sign of joy on their part, or any evidence that they were recognized by their former companions. As, however, they soon went down into their nest and were out of sight, this observation was not very satisfactory. I therefore took some of the ants which had been left in the nest, and placed them in the glass. They joined the others, and crossed antennæ in the usual way; but I saw no special signs of satisfaction or recognition. For the sake of comparison, I put some other red ants with them, and I could observe no difference of behaviour.

On *Oniscigaster Wakefieldi*, the singular Insect from New Zealand, belonging to the Family Ephemeridæ; with Notes on its Aquatic Conditions. By ROBERT MCLACHLAN, F.L.S.

[Read March 19, 1874.]

(Plate V.)

At the Meeting of the British Association for the Advancement of Science held at Bradford in September of last year, I brought before the notice of Section D a very singular species of Ephemeridæ that I had just received from my friend C. M. Wakefield, Esq., of Christchurch, Canterbury Settlement, New Zealand, and which I proposed to name *Oniscigaster Wakefieldi*, the generic term being suggested by the formation of the terminal abdominal segments, they being provided on each side with wing-like corneous acute expansions strongly resembling a portion of an *Oniscus* or of some other Crustacean, and the true relationship of which,

if examined only as a fragment, would scarcely be suspected. I had then received only female imagos; and an account of them (with a wood-cut) was published almost simultaneously in the *Entomologist's Monthly Magazine* for October 1874, vol. x. pp. 108-110. I have nothing to add to the generic diagnosis of the ♀ imago there given, excepting to indicate that instead of the 7th to the 9th abdominal segments only bearing the lateral corneous dilatations, the 6th to the 9th are really so furnished, a fact of which I was before doubtful, as indicated by a foot-note.

Recently I have received a further supply of the insect from Mr. Wakefield, and this time including males and the female subimago, before unknown to me. The male has, as I suspected, its eyes simple (as in the female), and very much longer anterior legs (a usual character in the family); but the abdomen is not much less robust than that of the female, and the middle tail is scarcely more abbreviated. The penultimate ventral segment carries a pair of 5-jointed forcipate appendages*.

I proceed to give an amended generic diagnosis of the female, and add thereto that of the male.

ONISCIGASTER.

(♀ *Imago*.) Corpus elongatum, valde robustum. Alæ quatuor; posticæ sat latæ, ovales; omnes venulis transversalibus ubique (anticæ apicem versus minus dense) regulariter reticulatæ. Pedes antici reliquis vix longiores; tarsi omnes 5-articulati, subæqualiter biunguiculati, posticorum articulo 4^o brevi sed valde distincto. Abdomen valde elongatum et robustum; segmentis 6^o-9^o utrinque conspicue corneo-alatis, acute productis; ultimo parvo, elongato, obtuso-conicali: ovivalvula nulla: caudæ tres elongatæ, sed mediana cæteris gracilior et brevior.

(♂ *Imago*.) Oculi ut in ♀ integri. Pedes antici valde longiores. Cauda mediana paullo brevior. Abdomen infra segmentum nonum appendicibus forcipatis 5-articulatis instructum.

In its specific characters the male agrees with the female perfectly in coloration. The forcipate abdominal appendages are

* Five joints are unusual, four being the normal number; but it appears to me that the so-called second joint actually exists, and is defined by a suture.

slender and white, excepting the more robust basal joint, which is brownish.

The female subimago differs in the body being greyish rather than a decided brown; and the wings are uniformly smoky-grey (the anterior pair paler at the base), which coloration is caused by the subimaginal pellicle. I give here an extended specific diagnosis.

ONISCIGASTER WAKEFIELDI.

(♀ *Imago*.) O supra nigro-fusca; thorace nitido; abdomine indistincte pallido-vario, infra flavido, nigro-punctato, segmentis singulatim macula magna nigra utrinque signatis: caudæ flavo-albidæ. Pedes flavi, late nigro-annulati. Alæ vitreæ, anticarum dimidio basali et posticis omnino læte fuliginosis: venæ venulæque nigræ; his ad anticarum marginem costalem valde incrassatis, nigro-marginatis et suffusis: humeris nigris vel nigro-fuscis.

Long. corp. (sine caudis) 10''' (= 21 mill.); exp. alar. 19''' (= 40 mill.).

(♀ *Subimago*.) Corpus griseum vel fusco-griseum. Alæ subopacæ, griseo-infumatæ (anticæ ad basin pallidiores); venis ut in ♀ coloratis.

(♂ *Imago*.) Corpus paullo minus robustum; appendicibus albis, articulo primo robusto, paullo fusco-tincto, 2° parvo, 3° valde elongato, gracili, curvato, 4° et 5° brevissimis, æqualibus; peni elongato triangulari, fusco, ad apicem exciso. Long. corp. (sine caudis) 9¼''' (= 19 mill.); long. caud. extern. circa 8''' (= 17 mill.); medianæ 2½''' (= 5 mill.); exp. alar. 16½''' (= 35 mill.).

The value of Mr. Wakefield's last consignment was greatly increased, inasmuch as accompanying it were two individuals of the aquatic conditions of the insects in spirits. These are so interesting that a somewhat detailed description is necessary. They are of different ages, and may be termed 'larva' and 'nymph' respectively, though, as is well known, these stages are defined in the Ephemeriidæ by no abrupt line of demarcation such as exists in the life-history of insects with more complete metamorphosis. I use the terms as a matter of convenience, because the larger individual has strongly developed rudimentary wings, and is evidently nearly mature, whereas the smaller only possesses the thoracic lobes which indicate the position of the wings.

I proceed to consider the larger individual, or "nymph," first. It is 12½''' (= 26 mill.) in length including the tails, and 9'''

(= 19 mill.) excluding those organs, which themselves are $3\frac{1}{2}$ " (= 7 mill.) long. Probably it has arrived at its last stage, immediately before assuming the aërial condition of subimago, the rudimentary wings extending slightly over the suture between the third and fourth abdominal segments. The general colour (as is usual with many aquatic larvæ) is undecided, but may be termed greyish-olive. The *head* is small, with simple hemispherical *eyes*. The *antennæ* in this individual are mutilated, but probably they resembled those of the smaller specimen noticed below. The frontal portion of the disk, above, forms a slightly concave triangular space bordered by raised keels on either side; and these are continued as a single keel to the front margin, which is rounded; and when viewed from beneath, attached to it is seen the transversely subquadrate *clypeus*, and the large *labrum*, the front edge of which is very slightly rounded and raised and with obsolete angles, the margins being slightly ciliated. The *mandibles* are very broad; viewed from above there are two strong blackish teeth on the outer angle, each divided into two or more smaller teeth; and to these succeeds a concave edge; and the inner angle and edge possess what seems to be a pectinated fringe. Viewed from beneath the external teeth are still more prominent, and they are succeeded by a long moveable testaceous spine, the inner angle and margin being provided with a kind of cup-shaped sucker formed by the dense pectinated fringe (if such it really be) noticed above: the dentition &c., of the two mandibles is not quite symmetrical, that which frequently occurs in insects. The *maxillæ* are large and elongate, with strong teeth on the apical portion, and with a false suture, giving them the appearance of being divided into two longitudinal portions. The *maxillary palpi* are 3-jointed, stout, all the joints nearly equal in length, but each successively rather thinner. The *labium* is deeply divided into four palpiform lobes, the two on one side being curved in a direction opposed to those on the other, so that the two inner approach each other at base and apex. The *labial palpi* are 3-jointed, very stout, the apical joint obtuse and considerably shorter than the others. The *pronotum* is very narrowly transverse. The *mesonotum* and *metanotum* are consolidated into one large convex oval piece, with a median longitudinal suture and two semilunate foveæ posteriorly; the posterior margin produced into a lobe. The rudimentary *wings* are elongate, elliptical, and with strong indications of veins. The *abdomen* is some-

what depressed, broadest at the third segment, and gradually decreasing to the apex; each segment (excepting the tenth, and perhaps the first) is produced at the sides into an acute wing-like dilatation (similar to that on the terminal segments of the imago); and, in addition, there is a like-formed tooth, or dilatation, placed vertically on the middle of each segment, forming a serrated dorsal crest; on the dorsum of each segment, from (I think) the second to the sixth, is, on each side, a large rounded external gill or branchial lamina, very densely reticulated by a network of tracheal ramifications, most densely on the margins, because on the disk they form somewhat large cellules; each gill overlaps that on the succeeding segment, and is possibly double, for there appears to be an indication of a lower gill one half shorter than the upper; but I have been unable to separate them: these gills are only well-defined when the animal is floating free in the spirit; for they are so delicate that they disappear if it become at all dry: the tenth or terminal segment is somewhat conical: viewed from below the rudiments of the appendages are plainly discernible in the male nymph, proceeding from the margin of the penultimate segment and indistinctly 3-jointed, the middle joint being the longest; between them are two tubercles indicating the rudiments of the penis. The three *tails* are of nearly equal lengths, rather short, and each gradually attenuated to the end; the two outer are curved inwardly at the apex; each has a long dark space in the middle; the joints are short and indistinct, excepting under a high power, when the sutures are plainly visible, and seen to be furnished with minute blackish teeth; internally each of the outer tails has long ciliations; and the median is ciliated on both sides, all the cilia interlacing and giving to the tails when in the spirit the appearance of a single broad lamina. The *legs* are short and rather stout, without teeth; the trochanters small; the femora are the longest and stoutest joints, the tibiæ being shorter and less stout, and with a false suture near the base causing an appearance of a small intermediate joint; the monomerous tarsi are longer than the tibiæ, and articulated to them in a very oblique manner; the end claw is short and curved, acute at the apex.

The smaller individual or "larva" is 10''' (= 21 mill.) long, including the tails, and $7\frac{1}{2}$ ''' (= 16 mill.) without the tails; its greatest breadth is $2\frac{1}{3}$ ''' (= 5 mill.). The *antennæ* are short, composed of twelve more or less moniliform joints, whereof the

two at the base are much stouter than the others ; they gradually diminish in stoutness from base to apex, the apical joint being subacute. (As these organs are wanting in the more mature individual, it is impossible to say if the number of joints varies according to age.) The thoracic lobes (whence the wings eventually proceed) only partially cover the sides of the second abdominal segment. In other respects this individual does not differ structurally from that above described, only that (supposing it to be also a male) there are no indications of the rudimentary appendages &c.

This remarkable insect would appear to be common at Christchurch ; for Mr. Wakefield says the cast subimagonal skins are no rarities there, sticking on walls, windows, &c. ; and he modestly accords the credit of its original discovery to his fellow townsman Mr. Fereday, who some years since sent an individual intended for me to this country, but which, by an accident, never came under my notice.

The Rev. A. E. Eaton (the author of the elaborate 'Monograph on the Ephemera' in the Transactions of the Entomological Society of London, 1871, Part i.) remarks that the structure of the aquatic conditions shows that the creatures are of active habits, swimming freely among water-plants, &c. and not semi-fossorial, as is the case with some members of the family. He thinks the genus related to *Siphururus* (which has an indication of lateral expansions of the abdominal segments), and through it distantly to *Cloëon*, but in the earlier states rather than in the imago ; for *Cloëon* has double eyes in the male. With regard to my idea of there being a second smaller branchial plate under the large upper one, he rather inclines to the belief that it is only an illusory appearance caused by inflation with the spirits ; but to my eyes the appearance became more marked in a plate I had detached, and which became dry from evaporation. I tender my warmest thanks to Mr. Eaton for information as to probable habits and affinities, which his critical knowledge of the group renders additionally valuable.

The great lateral expansion of the margins of the abdominal segments is without a parallel in any known perfect insect of the group. In the aquatic conditions there are occasional indications of it, especially in the extraordinary *Bætisca obesa* of Say, a North-American species, the nymph of which has been described by the late B. D. Walsh (from specimens found in Illinois).

But in this species there is an enormous development of the thoracic surface, this portion of the body forming a kind of carapace, covering all but the terminal segments of the abdomen, and concealing the rudiments of wings. And it must be noted that the formation of the abdominal segments in the aquatic conditions of *Bætisca* disappear in the perfect and subimaginal conditions, which are only remarkable for the very obese thorax.

The formation is again seen in the terminal segments of the extraordinary animals described by Latreille as a genus of branchiopod *Crustacea* under the name of *Prosopistoma*, but which, I think, are now sufficiently proved by the French entomologists N. and E. Joly (father and son) to be the aquatic conditions of some unknown species of Ephemeriðæ, although when they first expressed the idea of such a connexion I confess to having been sceptical. The typical examples of *Prosopistoma* may be regarded as belonging to an insect inhabiting Madagascar, and are now in the Hopeian collection at Oxford, in charge of Professor Westwood. But the form also occurs in France, and was figured and described by Geoffroy in the 'Histoire abrégée des Insectes de Paris' under the name of 'Binocle à queue en plumet.' It was re-found many years afterwards by Duméril in the Bois de Boulogne, but again disappeared until the Messieurs Joly found it in the Garonne, at Toulouse. It, like *Bætisca*, has also an enormous carapace, but of a more rounded form. Latreille described it as *Prosopistoma punctifrons*, placing it, as before stated, among the branchiopod *Crustacea*; and though succeeding authors copied his description, its position among the *Crustacea* was never thoroughly admitted. I think we must accord to the Jolys the merit of having discovered its true position: but it is hard to imagine what the perfect insect can be like; for no European species yet known shows any approach towards the characters so prominent in these aquatic creatures*. That these are not Crustaceous is sufficiently proved by the fact that the Messieurs Joly have at length discovered five pairs of gills on the first five

* One is tempted to ask the questions:—Can there be minute *apterous Ephemeriðæ*? and can the imago of *Prosopistoma* be in that condition? Such a thing is by no means impossible; for apterous exceptions exist in almost all groups of winged insects. If so, it would account for the absence of wing-rudiments in all the individuals dissected by the Jolys. The solution of the mystery surrounding *Prosopistoma* is waited for impatiently by all entomologists who take an interest in the more philosophical branch of the science.

abdominal segments, hidden under the thoracic carapace, as detailed in their account given in the 'Annales des Sciences Naturelles' for 1872, article 7, sufficient to bear them out in their "preuves péremptoires" that the creatures are insects, and quite analogous to the branchial plates of Ephemeridæ. Having incidentally mentioned *Prosopistoma*, I thought it right to enter into the question of its relations according to the researches of the French entomologists, especially as, at one time, I had expressed myself uncertain as to the correctness of their deductions.

EXPLANATION OF PLATE V.

- Fig. 1. Male imago; 1 *a*, underside of apex of abdomen; 1 *b*, appendages and penis, from beneath.
2. Female imago.
 3. Female subimago.
 4. Portion of "larva;" 4 *a*, antenna of the same.
 5. "Nymph" nearly mature; 5 *a*, leg; 5 *b*, branchial plate; 5 *c*, labrum; 5 *d*, maxilla, with palpus and mandible, seen from above; 5 *e*, the same, seen from beneath; 5 *f*, labium and palpi; 5 *g*, apex of abdomen, from beneath.

A new Australian Sphæromid, *Cyclura venosa*; and notes on *Dynamene rubra* and *viridis*. By the Rev. T. R. R. STEBBING, M.A., of Tor-Crest Hall, Torquay. (Communicated by W. W. SAUNDERS, Esq., F.R.S., V.P.L.S.)

[Read May 7, 1874.]

(PLATES VI. & VII.)

THE Sphæromid figured in the accompanying Plate appears to belong to a new genus of that family. It was "found under stones in Sidney harbour, in society, at the lowest ebb tides," by Mr. Stevenson, when collecting in Australia some years ago for W. Wilson Saunders, Esq., F.R.S., from whom I received the specimen.

The generic character consists in the attachment of the inner plate of the uropoda to a tooth which projects both forwards and upwards from the extremity of the tail, and in the extension of both plates of the uropoda beyond this projecting tooth, the outer plate folding partially beneath the inner, but extending beyond it.

It agrees with the Australian species *Cymodocea armata* in the prolongation of the seventh segment of the body over the tail. This process in the species now under description is not unlike

